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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Donald V. Smart
Patent No. : 6,791,059 B2
Issue Date : September 14, 2004
Serial No. : 10/036,431
Filed : January 7, 2002
Title : LASER PROCESSING

Art Unit : 1725
Examiner : Samuel M. Heinrich

Attn.: Certificate of Corrections Branch
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF REQUEST FOR CERTIFICATE OF CORRECTION

Applicant hereby requests that a certificate of correction be issued for the above patent in accordance with the attached request.

All errors sought to be corrected were made in printing by the Patent and Trademark Office, and no fee is believed to be due.

Please apply any charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: September 20, 2004

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UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,791,059 B2

DATED : SETPEMBER 14, 2004

INVENTOR(S) : DONALD V. SMART

It is certified that an error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Specification:

Column 9, line 24, delete [[K]] and insert -- κ -- (a Greek kappa).

Column 10, line 56, delete [[Nd:V_{04}]] and insert – Nd:VO_4--.

Column 11, line 40, after "pump efficiency" delete [[^{E}]] and insert --E is--.

Column 12, line 5, delete [[Electrons]] and insert --Electronics--.

Column 12, line 28, delete [[$r^{n}(r)$]] and insert -- $r\eta\ (r)$ -- (use a Greek eta instead of a superscript n).

Column 12, line 33, delete [[^{n}(r)]] and insert --η(r)-- (use a Greek eta instead of a superscript n).

Column 12, line 34, delete [[^{n}(r)]] and insert --η(r)-- (use a Greek eta instead of a superscript n).

Column 14, line 32, delete [[lasers]] and insert --laser--.

In the Claims:

Column 18, line 53, insert the following claims 32-51, which correspond to application claims 88-107 (the Notice of Allowability dated June 1, 2004 stated, "The allowed claim(s) is/are 57-107."):

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PATENT NO. : 6,791,059 B2

DATED : SEPTEMBER 14, 2004

INVENTOR(S) : DONALD V. SMART

It is certified that an error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

-- 32. A laser-based method of vaporizing and removing a target link structure on a semiconductor wafer comprising the steps of:

providing a target link structure supported on a silicon substrate, the substrate being part of a semiconductor memory device;

producing a laser beam having a pulse width less than about 10 nanoseconds, an operating repetition rate of 5 kilohertz or higher, and a wavelength less than 1.2 microns;

generating computer-controlled timing signals synchronized with position of the laser beam relative to the target link structure;

controllably switching an optical switch based on the timing signals so as to transmit an output pulse of the laser beam to the target link structure on demand, the output pulse rate being controlled by controlling the optical switch;

focusing the output pulse onto the target link structure into a spot diameter;

whereby the spot size and depth of focus is improved relative to a longer wavelength greater than 1.2 microns, and the output pulse width limits damage to the substrate.

33. The laser system of claim 32 wherein the laser beam has a pulse width less than precisely 10 nanoseconds.

34. The laser system of claim 32 wherein the laser beam has an operating repetition rate of 10 kilohertz or higher.

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DATED : SEPTEMBER 14, 2004

INVENTOR(S) : DONALD V. SMART

It is certified that an error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

35. A laser system for vaporizing and removing a target link structure on a semiconductor wafer, comprising:

a laser assembly configured to produce a laser beam having a pulse width less than about 10 nanoseconds, an operating repetition rate of 5 kilohertz or higher, and a first wavelength, and configured to shift the first laser wavelength to a second laser wavelength, the second wavelength being less than 1.2 microns;

a computer programmed to control timing signals synchronized with position of the laser beam relative to a target link structure supported on a silicon substrate, the substrate being part of a semiconductor memory device; and

an optical switch that is controllably switchable based on the timing signals so as to transmit an output pulse of the laser beam to the target link structure on demand, the output pulse rate being controllable by controlling the optical switch, the laser assembly being configured to focus the output pulse onto the target link structure into a spot diameter;

whereby the spot size and depth of focus is improved relative to a longer wavelength greater than 1.2 microns, and the output pulse width limits damage to the substrate.

36. The method of claim 35 wherein the laser beam has a pulse width less than precisely 10 nanoseconds.

37. The method of claim 35 wherein the laser beam has an operating repetition rate of 10 kilohertz or higher.

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INVENTOR(S) : DONALD V. SMART

It is certified that an error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

38. A method of vaporizing and removing a target link structure on a silicon substrate, comprising the steps of:

providing a computer controlled ,diode-pumped, q-switched, solid-state laser assembly;

producing a laser beam output having an output pulse width less than about 10 nanoseconds at an operating repetition rate of about 5 kilohertz or higher, and a wavelength shorter than 1.2 microns; and

focusing the output pulse onto the target link structure into a spot diameter.

39. The method of claim 38 wherein the laser beam has a pulse width less than precisely 10 nanoseconds.

40. The method of claim 38 wherein the laser beam has an operating repetition rate of 10 kilohertz or higher.

41. The method of claim 38 wherein the laser wavelength is about 1.047 microns.

42. The method of claim 38 wherein the laser wavelength is about 1.064 microns.

43. The method of claim 38 wherein the link is a thin link less than one micron in width , and whereby the spot size and depth of focus is improved relative to a longer wavelength greater than 1.2 microns, and the output pulse width limits damage to the silicon substrate.

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INVENTOR(S) : DONALD V. SMART

It is certified that an error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

44. The method of claim 43 wherein the link is a polysilicon link.

45. The method of claim 43 wherein the link is a metal link.

46. The method of claim 38 wherein the solid state laser system further comprises an optical switch positioned beyond the laser cavity and external to the laser cavity and wherein the method further comprises controllably switching the optical switch based on computer controlled timing signals so as to transmit an output pulse of the laser beam to the target link structure on demand, the output pulse rate and pulse spacing being controlled by the controlling the optical switch.

47. The method of claim 38 wherein the output pulse width is less than about 5 nanoseconds.

48. The method of claim 38 wherein the output pulse width is less than about 8 nanoseconds.

49. A laser system for vaporizing and removing a target link structure on a silicon substrate, comprising:

a diode-pumped, q-switched, solid-state laser assembly;

a computer programmed to control the laser assembly to cause the laser assembly to produce a laser beam output having an output pulse width less than about 10 nanoseconds at an operating repetition rate of about 5 kilohertz or higher, and a wavelength shorter than 1.2 microns;

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the laser assembly being configured to focus the output pulse onto the target link structure into a spot diameter.

50. The system of claim 49 wherein the laser beam output has an output pulse width less than precisely 10 nanoseconds.

51. The system of claim 49 wherein the laser beam output has an operating repetition rate of 10 kilohertz or higher.--

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